IAF SPACE TRANSPORTATION SOLUTIONS AND INNOVATIONS SYMPOSIUM (D2)
Future Space Transportation Systems (4)

Author: Ms. Kate Underhill
European Space Agency (ESA), France, kate.underhill@esa.int

Mr. Jérôme Breteau
European Space Agency (ESA), France, Jerome.Breteau@esa.int
Mr. Jean-Noel Caruana
European Space Agency (ESA), France, jean-noel.carunana@esa.int
Ms. Jamila Mansouri
European Space Agency (ESA), France, jamila.mansouri@esa.int
Mr. Jorgen Bru
European Space Agency (ESA), France, jorgen.bru@esa.int

PREPARING THE FUTURE OF EUROPEAN SPACE TRANSPORTATION

Abstract

The ESA Space Transportation Directorate's Future Launchers Preparatory Programme (FLPP) works on new technologies providing higher performance, larger mission versatility and cost gains to the evolutions of operational launchers based on the investigation of future space transportation services and advanced concepts. At the Ministerial Conference of ESA in 2016, the FLPP "New Economic Opportunities" (NEO) period was subscribed, with the goal of framing and developing a portfolio of flagship demonstrators and associated technologies to ensure short time to market of price-competitive innovations for possible evolutions of European launchers.

FLPP is oriented around a triangle of – System/Services – Technologies – Demonstrators – supporting the maturation of technologies up to their integration into flagship demonstrators, in line with system studies justifying their interest for future service-centric applications, including commercially driven space transportation services.

A new cycle is starting in future preparation, investment in system and business analyses as well as a diversified portfolio of integrated demonstrators and key technologies is mandatory to:

- Significantly reduce the recurrent cost of European launch solutions
- Enable a quick reaction to opportunities and threats by shortening the development cycles and reducing the time to market for new launch capabilities
- Prepare further evolutions and ruptures towards a more service-centric approach
- Open the way for spin-ins and COTS applications
- Secure unrestricted access to new and critical technologies, safeguarding innovation and engineering competences in Europe
- Reinforce the competitiveness of industrial partners
- Propose business opportunities for newcomers

Current FLPP activities include studies on evolutions of Ariane launchers focused on services to customers and completed with commercially self-sustaining micro-launchers, reusability interest investigation

and demonstration, an advanced avionics test bed, investigations into propulsion solutions for increased launcher mission versatility (green propellants, kick-stages), a full-scale Vinci-2 precursor thrust chamber demonstrator undergoing hot-fire testing in 2018 and ultra-low cost propulsion solutions. All this work is underpinned by the identification and maturation of advanced technologies, applicable across multiple domains, including additive manufacturing in various forms (selective laser melting, cold gas spray, laser metal deposition, etc.), reliable sensors, fault-tolerant controllers, low mass structures and the development of modelling tools but also new low-cost production processes.

The programme and a selection of current activities are presented in this paper, providing for competitive evolutions of European launchers, supporting European industry in space transportation research and technology and looking forward towards innovative and effective solutions for new space transportation services.